

- 41 -

What is claimed is:

1. A protein comprising a gp120 V1/V2 domain of an HIV-1 strain and not comprising the gp120 V3 domain of an HIV-1 strain, wherein said protein does not substantially  
5 bind CD4, said gp120 V1/V2 domain of said protein displaying an epitope which is recognized by an antibody which neutralizes at least one HIV-1 primary isolate with a  $ND_{90}$  of less than 100  $\mu\text{g/ml}$ .
2. The protein of claim 1, wherein said V1/V2  
10 domain epitope is recognized by an antibody which neutralizes at least one HIV-1 primary isolate from each of at least two different clades with a  $ND_{90}$  of less than 100  $\mu\text{g/ml}$ .
3. The protein of claim 1, wherein said said two  
15 different clades are selected from the group consisting of clade A, clade B, clade C, clade D, and clade E.
4. The protein of claim 1, wherein said V1/V2 domain epitope is recognized by an antibody which neutralizes at least two HIV-1 primary isolates of the  
20 same clade with a  $ND_{90}$  of less than 100  $\mu\text{g/ml}$ .
5. The protein of claim 3, wherein said V1/V2 domain epitope is recognized by an antibody which neutralizes at least one HIV-1 primary isolate of at least three different clades selected from the group  
25 consisting of clade A, clade B, clade C, clade D, and clade E, with a  $ND_{90}$  of less than 100  $\mu\text{g/ml}$ .
6. The protein of claim 1 wherein said  $ND_{90}$  is less than 50  $\mu\text{g/ml}$ .

- 42 -

7. The protein of claim 1 wherein said ND<sub>90</sub> is less than 20 µg/ml.

8. The protein of claim 1 wherein said ND<sub>90</sub> is less than 10 µg/ml.

5 9. The protein of claim 1 wherein said ND<sub>90</sub> is less than 5 µg/ml.

10. The protein of claim 1 wherein said ND<sub>90</sub> is less than 1 µg/ml.

11. The protein of claim 1 wherein said V1/V2  
10 domain comprises a region that is at least 50% identical to GEIKNCSFNITTSIRDKVQKEYALFYKLDIVPID.

12. The protein of claim 1 wherein said V1/V2 domain comprises a region that is at least 75% identical to GEIKNCSFNITTSIRDKVQKEYALFYKLDIVPID.

13. The protein of claim 1 wherein said V1/V2  
15 domain comprises a region that is at least 90% identical to GEIKNCSFNITTSIRDKVQKEYALFYKLDIVPID.

14. The protein of claim 1 wherein said V1/V2 domain is at least 50% identical to  
20 VKLTPLCVTLNCIDLRNATNATSNSNTTNTTSSSGGLMMEQGEIKNCSFNITTSIRD KVQKEYALFYKLDIVPIDNPKNSTNYRLISCNTSVITQA (SEQ ID NO: 1).

15. A protein comprising a gp120 V1/V2 domain related region that is at least 50% identical to  
VKLTPLCVTLNCIDLRNATNATSNSNTTNTTSSSGGLMMEQGEIKNCSFNITTSIRD  
25 KVQKEYALFYKLDIVPIDNPKNSTNYRLISCNTSVITQA (SEQ ID NO: 1) and not comprising the gp120 V3 domain of an HIV-1 strain, wherein said protein does not substantially bind CD4, said gp120 V1/V2 domain related region displaying an

- 43 -

epitope which is recognized by an antibody which neutralizes at least one HIV-1 primary isolate with a ND<sub>90</sub> of less than 100 µg/ml.

16. The protein of claim 1 wherein said V1/V2 domain is at least 90% identical to  
VKLTPLCVTLNCIDLRLNATNATSNSNTTNTTSSSGGLMMEQGEIKNCSFNITTSIRD  
KVQKEYALFYKLDIVPIDNPKNSTNYRLISCNSTSVITQA (SEQ ID NO: 1).

17. The protein of claim 1, wherein said protein is a glycoprotein.

18. A protein comprising a gp120 V1/V2 domain of an HIV-1 strain and not comprising a gp120 V3 domain of an HIV-1 strain, wherein said protein does not substantially bind CD4, said protein, when used to immunize a rat, being capable of eliciting an antibody which neutralizes at least one clade B HIV-1 primary isolate and at least one clade D HIV-1 primary isolate with a ND<sub>90</sub> of less than 100 µg/ml.

19. Monoclonal antibody which binds the gp120 V1/V2 domain of HIV-1 strain Case-A2 and neutralizes at least one clade B HIV-1 primary isolate and at least one clade D HIV-1 primary isolate with a ND<sub>90</sub> of less than 100 µg/ml.

20. The monoclonal antibody of claim 19 wherein said antibody neutralizes at least one clade A HIV-1 primary isolate with a ND<sub>90</sub> of less than 100 µg/ml.

21. A method for stimulating the formation of antibodies capable of neutralizing infection by an HIV viral isolate in at least one mammalian species, which comprises immunizing a mammalian subject with a composition comprising the protein of claim 1.

- 44 -

22. The method of claim 21 wherein said composition is suspended in a pharmaceutical carrier or vehicle.

23. The method of claim 21 wherein said composition comprises an adjuvant.

5 24. The method of claim 23 wherein said adjuvant is an aluminum salt.

25. The method of claim 23 said adjuvant is an oil-in-water emulsion comprising a emulsifying agent and a metabolizable oil.

10 26. The method of claim 21 wherein said composition is administered to said mammalian subject by injection.

27. An nucleic acid molecule encoding the protein of claim 1.

15 28. An expression vector comprising the nucleic acid molecule of claim 27.

29. A host cell harboring the vector of claim 28.

30. A hybrid protein comprising a first part and a second part, said first part comprising the protein of claim 1, said second part comprising an amino terminal carrier protein comprising all or a portion of Friend MuLV gp70.

31. The protein of claim 30 wherein said portion of gp70 comprises amino acids 1-33 of gp70.

25 32. A protein comprising a first portion and a second portion, said first portion being a V1/V2 domain region homologous to PCVKLTPCV, said second portion being

- 45 -

a V1/V2 domain region homologous to SCNTSVITQACP, said first and second portions being linked by at least one disulfide bond.